DOASSANSIA INTERMEDIA Setch.—Doassansia intermedia Setch., Bot. Gaz. 19:185-6. 1894. Doassansia affinis Ell. & Dearn., Bull. Torr. Bot. Club 22:364. 1895.

Host: Sagittaria variabilis, Minn., N. H. (type), Can. (type D. affinis).

TRACYA LEMNAE (Setch.) Syd.—Cornuella lemnae Setch., Proc. Amer. Acad. Arts. Sci. 26:19. 1891. Tracya lemnae Syd., Hedw. Beibl. 40:2. 1901.

Host: Spirodela polyrrhiza, Conn., Mass. (type), R. I., Wisc.

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NOTES ON FUNGI.

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The following notes are largely composed of observations made upon a variety of fungi and are based upon field and laboratory study of the same during the intervals of a busy career of teaching. They are gathered together, therefore, in the hope that they may prove useful to other workers in the same field of inquiry. It is the intention of the writer to add to them from time to time, as the material collected and the observations upon the same seem to warrant their publication in serial form.

BOX TORTOISES AND TOADSTOOLS.— The common box tortoise (*Cistudo virginica*) of our eastern woodlands is extremely fond of a rather frequent toadstool, *Russula virescens* Fr. A number of caps of this fungus, found in the woods at Primos, Delaware Co., Pa., on August 7, 1901, were gnawed in a rather jagged manner. Later, a tortoise was found immediately in front of a large light green Russula. It stopped work upon the approach of the observer, and although it was watched for some time, it remained perfectly quiet and alert. An inspection of its horny beak, however, revealed torn fragments of the toadstool smeared over the horny surface. I, therefore, succeeded in connecting the tortoise with the torn aspect of the fungus.

THE CULTURE OF MONILIA MARTINI S. & E. VAR. INCENDIARIUM E. & E.— The fungus in question grows on trees killed by fire, where it forms a superficial growth of a bright, orange-yellow color. It was distributed by Ellis in his North American Fungi (No. 1389), and I am indebted to that botanist for the identification of the plant discovered by me in great abundance on burned willow limbs in Woodland Cemetery, Philadelphia.

It was found to be good material to demonstrate to botanical classes typical conidial formation. The following experiments

were tried to ascertain the best media upon which to cultivate it. A number of substances, viz., potatoes, slices of bananas, banana skins, slices of orange, Neuchatel cheese, orange peels, slices of apple, prune broth, stewed prunes, molasses, pine charcoal and bread were used as culture media. The pine charcoal was tried, because the fungus was found growing on burned trees. Spores were sown by means of a sterilized platinum loop wetted in distilled water and applied with the spores to the surface of the several culture media. The following account gives in synopsis the results obtained.

POTATO (raw and cut open).— No perceptible growth.

BANANA SLICES.— No growth of Monilia, but a rich development of *Penicillium glaucum* Link. and later of *Rhizopus nigricans* Ehbg.

BANANA SKIN.— Covered by *Penicillium glaucum* Link. and a small round patch of Monilia.

ORANGE SLICES.— Invaded by Penicillium and Rhizopus.

ORANGE PEELS.— Not suitable for Monilia.

APPLE SLICES.— No development of the orange-yellow fungus.

PRUNE BROTH.— Monilia made a rapid growth upon the surface of the broth, the conidial chains being formed most plentifully along the edges of the Petri dishes in contact with the air.

STEWED PRUNES.— This culture material was covered by a luxuriant growth of Rhizopus, later by Penicillium and a scattering growth of Monilia between the denser mycelia of the above named moulds.

NEUCHATEL CHEESE. — No development of *Monilia martini* S. & E. var. *incendiarium* E. & E.

MOLASSES.— No growth of any sort, although a plentiful supply of spores was sown.

PINE CHARCOAL.— Spores of the fungus studied were sown upon the surface of several charcoal blocks. Monilia, although, as its varietal name implies, made a growth on this medium.

BREAD.— Of all the materials experimented with, bread was found to be the most suitable substance upon which to grow *Monilia martini* S. & E. var. *incendiarium* E. & E. The fungus later was kept for several months in a flourishing condition on bread alone. Upon bread, it forms a white, cottony mycelium, later, as the conidia are formed, assuming an orange-yellow color. Three to five days elapse, depending upon the weather, from the time the spores are sown until a new crop of spores is obtained. The fungus can be kept alive for about three weeks, when another sowing upon fresh bread should be made.

PEZIZA REPANDA WAHLENB. IN PENNSYLVANIA. — McIlvaine in his book "One Thousand American Fungi" (p.558) gives the distribution of this fungus, as: New York, Ellis; Minnesota, Johnson; Ohio, Lloyd; Pennsylvania, Miller. It occurs, according to him, on the ground, or on decaying wood. M. C. Cooke (Handbook of British Fungi II, p. 669) mentinos it as one of the British funguses occuring on the ground and on stumps. It was discovered by the writer at Sherwood, near Angora, Philadelphia on an old rotten log in very considerable abundance. The specimens collected, some two or three hundred in number, varied in size from the diameter of a ten cent piece to one or two, or three inches across. The individuals were clustered, or disposed singly; some were saucer-shaped, others deeper and more bowl-shaped. The color was nearly white on the outer surface and a light, yellowish-brown color on the concave inner side.

SPORE DISCHARGE IN PEZIZA BADIA PERS.— A considerable amount of this ascomycete was found at Crum Creek, Penna., May 20, 1901. When gathered in the hand and held for a moment, a discharge of the spores took place with a puff, like the curling smoke at the muzzle of a discharged gun. At intervals of several minutes, the same phenomenon took place until apparently all of the spores had been set free from the asci.

CLITOPILUS ABORTIVUS B. & C.— The statement is made in an authoritative work on the fungi of North America, that "the fungus is so named because of the abortive form of it frequently found associated with it." From this sentence, one would infer, that the normal form is more abundant than the aborted one which is found with it. Nevertheless in the season of 1901, the aborted plants were by far the most abundant in the neighborhood of Philadelphia. A search through several woods was rewarded by the collection of many specimens of the rounded, egg-shaped, aborted form and only a few examples of the normal gill-bearing fungus.

DISTRIBUTION OF THE NUCLEI IN THE FEEDING PLASMODIUM OF FULIGO SEPTICA GMEL.— I have described elsewhere* the peculiar feeding habits of the plasmodium of *Fuligo septica* Gmel. Sections of the host fungus *Pleurotus sapidus* and of the plasmodium which was actively streaming over it were made and mounted in balsam. The material was killed and hardened in 95 per cent. alcohol, was passed into paraffin, cut, and stained on the slide. Iron-haematoxylon was found the most satisfactory stain, the sections being left in the iron stain 4 hours and in haematoxylon 12 hours. A study of the sections, thus prepared, showed an interesting character of nuclear distribution, and served to prove further, that the nucleus serves as the trophic

* Harshberger, Bot. Gaz. 31:198. 1901.

center of the cell. A fragment of a cell deprived of its nucleus may live for a considerable time and manifest the power of coordinated movement without perceptible impairment. Such a mass of protoplasm is, however, devoid of the powers of assimilation, growth and repair, and sooner or later dies. In other words, those functions that involve constructive metabolism cease with its removal. There is, therefore, strong reason to believe, that the nucleus plays an essential part in the constructive metabolism of the cell, and through this is especially concerned with the formative processes involved in growth and development. For these and many other reasons, the nucleus is generally regarded as a controlling centre of cell activity.* This activity of the nucleus is still further confirmed by a study of the plasmodium in question. Before hardening the material in alcohol, the streaming protoplasm of the myxomycete formed a loose reticulum. The main streams of movement were cord-like and in places heaped up into considerable masses lying upon the gill surface of the mushroom. A section across the gills of the oyster-mushroom with the feeding plasmodium upon it shows the strings of plasmodial protoplasm in cross section. The protoplasm, when stained with iron haematoxylon, is found to be spongy in nature with large, open chambers across which run delicate strands of plasmic substance. The nuclei vary in such sections of individual streams of protoplasm, according to the following count: 175, 45, 33, 157, 8, 25, 20, 50, 172, made at random. The nuclei are dark, and they appear, therefore, as small dark circular grains in the faintly stained protoplasm. Their distribution in this protoplasm concerns us here. The larger number of nuclei are found in close proximity to the gill surface of the mushroon upon which the plasmodium is feeding. In some cases, they are so crowded together as to appear in the form of an irregular deeply staining mass in close contact with the food substance. The distal surface of the plasmodium contains few, or no nuclei, and the central body of protoplasm quite a number. One, however, is struck by the large number of nuclei that lie near the actively digesting lower surface. This distribution of the nuclei is of interest in connection with the statement above that the nucleus controls the constructive metabolism of the cell. The digestion of the food presupposes the activity of several ferments. That a process of digestion is going on is evident from an inspection of the gill surfaces. Here the spores have been removed from their sterigmata, the sterigmata have been digested and the free ends of the basidia have been planed down by the zymogenic activity of the plasmodium. Apparently, the distribution of the food supply is regulated by the large number of nuclei, that seem to be attracted

* Wilson, The Cell in Development and Heredity, 30. 1900.

chemotactically to the incoming supplies of newly prepared food substances.

HYPOXYLON COCCINEUM Bull. AND ALCOHOL. — Hypoxylon coccineum Bull. is a pyrenomycetous fungus found growing on the limbs of beech trees. As far as the writer knows, the species is confined to a single host — the beech. In color, the fruit bodies are a dark, brick-red color. The stromata are erumpent, subglobose; $\frac{1}{4}$-$\frac{3}{4}$ cm. in diameter, and solitary, or partially confluent. When placed in alcohol, the brick-red color is removed and the subglobose stroma became umber-brown in color. The alcohol becomes a sherry wine color through the presence of the dissolved pigment. The solution of the pigment begins almost immediately after the fungus is placed in alcohol.

RELATIONSHIP OF A FUNGUS (SCORIAS SPONGIOSA SCHW.) AND A SCALE INSECT (SCHIZONEURA IMBRICATOR).— Living on the limbs, twigs and leaves of the beech in the deep shade of the forest is found a scale insect (*Schizoneura imbricator*), which is covered by a woolw coat consisting largely of a waxy secretion from the body. This wool-like material is quite abundant, and where the insects live in masses together the entire limb, or leaf surface has a downy white appearance. The abdomen of the insect keeps constantly moving up and down with a jerking motion, and the cottony material, therefore, is in constant agitation. The insects secrete a honey dew, so copiously, that it flows down the main branches and trunks of the beech trees, spreads out over the surface of the beech leaves and finally reaches the ground where it covers the mosses and forest litter. As the insects die, their bodies covered with the downy wax become mixed up together with honey dew, so that a rich pabulum is provided suitable for the growth of fungi.

One fungous species in particular seems to be confined to the rich food, which as found upon the trees and on the ground is of an ash-gray color. The pyrenomycetus fungus in question, *Scorias spongiosa* Schw., soon appears and completely covers the ground, limbs and leaves where the ash-gray material collects. The mycelium of much branched, rigid, septate hyphæ is compacted together by a mucilagenous substance and forms a blackish, spongy mass, which bleaches to a yellowish brown color upon weathering. The larger glued together strands of the mycelium bristle with branches developed from the larger hyphæ. These rather rigid branches, interlocking together, assist in making a spongy texture, which gives specific name to the plant.

The perithecia of the fungus found by the writer are abundant, ovate, or pyriform. The spermagonia, however, which are enlarged at the base and taper into a long neck open at the apex, are more plentiful in the material from the woods along Crum Creek, Delaware Co., Penna., than the perithecia. The ascos-

pores are multicellular of a dark brown color, their cell walls being more evident and the constrictions between the cells more distinct than in the example figured by Ellis * in plate X, figure 3, of his North American Pyrenomycetes. The prodigious formation of sporidia in the spermagonia accounts for the phenomenal spread of the fungus during the early autumn days. The presence of the mycelium on the surface of the leaves does no apparent injury to the leaf substance. The fungus is a saprophyte and feeds superficially on the mixed honey dew and insect substance. When fully matured, the whole mass can be removed from the beech without the slightest injury to the upper leaf epidermis. However, the formation of starch in the leaf cells seems to be checked, *Scorias spongiosa* Schw., of a black color, acts as an almost perfect screen, shutting off the sun's rays, and thus influencing in a substantial manner the starch production of the beech host, so that, if it were not for supplies derived from other parts of the tree fully exposed to the sunlight considerable damage might be done to the shaded leaves. We have, therefore, in the saprophytic association here described another interesting example of the inter-dependence of organisms.

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* Ellis & Everhart, N. A. Pyrenomycetes, 55, pl. 10. 1892.

NOTES FROM MYCOLOGICAL LITERATURE. II.

W. A. KELLERMAN.

AN INTERESTING STUDY of Cladochytrium alismatis, found for the first time in America at Glacialis pond, Cambridge, Mass., is given by G. P. Clinton in the Botanical Gazette, 33:49-61. 3 pl. Jan. 1902.

ALTERNARIA CITRI Ellis & Pierce n. sp., the cause of Black Rot of Oranges, is described in the Botanical Gazette, 33:234-5, March 1902. The losses are from 3 to 10 per cent of the crop of navel oranges in the districts of California. The cells of the pulp sacks are destroyed, and soon become black in color and bitter to the taste.

THE OHIO AGRICULTURAL EXPERIMENT STATION has issued (Bulletin 128) a general index to its Reports and Bulletins, volumes 1 to 20, 1882 to 1901, a 43-page pamphlet. The references are not to the several Annual Reports and Nos. of the Bulletins but to the year and pages — a continuous pagination having been followed for the publications of each year after 1888. Under the head of "Diseases" of plants, of alfalfa, apple, asparagus,